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Experience in Organization of Urgent Medical Care in Large-Scale Accident Conditions at Nuclear Power Stations

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On the eve of the third millenium the post industrial civilization is turning into a high risk society. A growing number of man caused accidents and natural disasters have made the biospheric influence on man more aggressive. Today we cannot totally exclude emergency situations connected with possible nuclear power accidents on every level of the nuclear fuel cycle, when recycling nuclear ammunition and weaponized plutonium as well as many other cases. Combined with adverse ecological and hygienic effects accidents of this kind may result in negative medical consequences of radiation exposure.

According to a wide-spread opinion, the 20th century has been the most civilized and humane. However, the century is characterized by a growing trend of both man caused and natural emergencies, including radiation. According to the MAGATE information system concerning nuclear reactors 432 reactors operate in 30 countries (approximately 340 Gwt) which is 17% of the worldwide electricity production level. The Chernobyl Nuclear Disaster with its long-term medico-biological, ecological, economic and social consequences caused a situation close to an ecological catastrophe of a global level.

The analysis of experience in large-scale disaster management in many cases has shown, that the functioning public health, civil defense and military medical service systems have not responded to emergency situations promptly, failed to gather enough facilities and their activities on the spot have not been coordinated, which have resulted in negative outcome. The further development of nuclear power energy and allocation of nuclear power stations in densely populated areas require early planning, a complex system of medical and organizational measures, coordination of activities of various ministries and departments which manage nuclear power engineered enterprises as well as development and application of special measures for protection and care of maintenance staff and population to avoid or minimize the risk of their exposure.

In October 1986, after the Chernobyl Nuclear Disaster the Federal Center of Radiation Medicine of the Academy of Medical Sciences of the USSR was established (now the National Center of Radiation Medicine of the Ukrainian Academy of Medical Sciences) which included three institutes: the Epidemiology and Radiation Injury Prophylaxis Institute, the Clinical Radiology Institute (with a 300 bed clinic and an out-patients' clinic) and the Experimental Radiology Institute.

It should be noted, that the preservation of people's lives and health in emergency situations caused by natural disasters, accidents and catastrophes is a national task. To improve the system of measures for public health protection in radiation accident situations a search emergency medicine center "Zaschita" (Protection) was established in Moscow in 1990 under the aegis of the Biophysics Institute of the Ministry of Public Health of the USSR. On its base the All-Russian Emergency Medicine Center "Zaschita" was established in 1994. The Scientific Radiation Medicine Center became a base institution. In 1990 according to the Order of the Ministry of Public Health of the USSR the South-West Urgent Medical Care Center began to work as part of the Center.

In 1992, after Ukraine had become an independent country, the South-West Center was reorganized into a scientific department of urgent medical care in radiation accident situations, which operated jointly with the rapid response teams. This unit was attached to the Institute of Clinical Radiology. The teams were gathered according to voluntarism with obligatory life and health insurance provided for each member. In the so-called "quiet" period the team specialists took home duties. The South-West Center and the scientific department of urgent medical care during radiation accidents were independent research units of the Radiation Medicine Scientific Center and they pursued scientific research. Members of the staff of the Urgent Medical Care Department include:

Department manager - 1

Senior researcher - 2

Researcher - 1

Junior researcher - 1

Laboratory assistant with higher education - 1

Engineer of the 1st Category - 2

Senior laboratory assistant - 2

Technician - 1

4 rapid response teams (not on the permanent staff) were organized to include:

Team-leader (a medical radiologist);

Physicist (specialized in dosimetry);

Radiation hygiene medical specialist;

Nurse;

Driver (specialized in dosimetry);

Depending on the nature and scale of a radiation accident other specialists may be engaged (a hematologist, an endocrinologist, a psychiatrist, a neuropathologist, a pediatrician, a laboratory physician and others). The tasks of the Rapid Response Teams were:

- * Urgent qualified medical care in radiation accident situations on Ukrainian territory and in other countries.
- * Detection of radiation pollution level and preliminary individual radiation doses.
- * Triage to determine priorities for casualty admission into specialized treatment facilities.
- * Organization of hygienic and anti-epidemic measures.
- * Establishing effective communication with the Ministry Health of Ukraine and other organizations, (the WHO, the MAGATE, the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences) to give information concerning the nature and scale of an accident and the number of casualties right from the spot.
- * Providing coordination with respective institutions and services on the spot during disaster relief activities.

The key point is to provide interaction between the Urgent Medical Care Department of the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences with other institutions and departments in large scale accident situations.

For the period of their cooperation the Urgent Medical Care Department and the Rapid Response Teams visited the following sites of accidents:

- * Chernobyl (a fire in the cable subway of Power Unit1 at Chernobyl Nuclear Power Station on October 1, 1991)
- * Chernobyl (a fire Power Unit11 at Chernobyl Nuclear Power Station on October 11, 1991)
- * Dneprodzerzhinsk (a paintwork material factory on November 20, 1991)
- * Zolotonosha (an unauthorized ionizing radiation source was detected in a private house in 1993)
- * Chernobyl (an unauthorized gamma radiation source was detected in an apartment house in 1994).

During disaster relief activities at the forenamed sites the department and team specialists examined 482 patients, took 126 measurements of exposure doses. The examinations were made both on the spot and in the NCRM outpatient clinic and hospital. The department personnel has participated in 16 exercises and adequately represented the Ministry of Public Health in the “Partnership For Peace” NATO exercises. The department researchers have developed a package of documents including the following:

- * A concept of specialized urgent medical care service in radiation accident situations in Ukraine.
- * A structure of specialized urgent medical care service in radiation accident situations in Ukraine.
- * A statute concerning specialized urgent medical care service in radiation accident situations, centers, branches, the urgent medical care department and the rapid response teams.
- * Methodic recommendations “Urgent Medical Care in Radiation Accident Situations Organized and Provided by Rapid Response Teams” and “Urgent Medical Care Services in Radiation Accident Situations: Assessment of Their Preparedness”.

They also participated in the development of the “Medical Support of Nuclear Power Industrial Enterprises” State Program. In 1998 the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences was extended up to 560 beds. A marrow transplantation center and a rehabilitation center were opened. It should be noted that the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences has now become a unique specialized scientific and medical institution capable of solving urgent problems concerning dosimetry, hygienic and medical monitoring of victims of local and large scale accident casualties.

We consider it an honor and an evidence of our prestige that the World Health Organization recognized our Center as the collaborative organization in 1998. The Center cooperates with the WHO on the problems of critical radiation situations and medical preparedness for radiation accidents (WHO Collaborating Center for Radiation Emergency Medical Preparedness And Assistance Network (REMPAN)).

In conclusion, I would like to say that previous experience makes possible not to repeat the same mistakes as well as optimize a complex of preventive and accident relief measures for minimizing possible damage. The further development of the urgent medical care service in radiation accident situations within united national disaster medicine service will minimize both the risk of an emergency at nuclear power stations and manpower and financial expenditures of public health authorities and institutions. The Chernobyl experience has shown, that early planning, proper organization and permanent preparedness of each branch of the urgent medical service in radiation accident situations will make its work well-coordinated and effective both in so called quiet periods and in emergency situations.

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